TPMC/PORTS-60/R1

Theta Pro2Serve Management Company, LLC

Environmental Management & Enrichment Facilities

Waste Management Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Managed by
Theta Pro2Serve Management Company, LLC
for the Portsmouth/Paducah Project Office
of the United States Department of Energy

This document is approved for public release per review by:

Henry Thomas 9/19/2006

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Waste Management Plan
for the
Portsmouth Gaseous Diffusion Plant,
Piketon, Ohio

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Prepared for the
U.S. Department of Energy
Portsmouth/Paducah Project Office

THETA PRO2SERVE MANAGEMENT COMPANY, LLC
managing the
Infrastructure Activities at the
Portsmouth Gaseous Diffusion Plant
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CONTENTS

ACRONYMS

ACM	Asbestos-Containing Material
ACT	Energy Policy Act of 1992
ARARs	Applicable or relevant and appropriate requirements
ASM	Always-Safe Mass
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSB	Cold Standby
CSI	Criticality Safety Indices
D&D	Decontamination and Decommissioning
DMSA	DOE Material Storage Area
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
FY	Fiscal Year
GCEP	Gas Centrifuge Enrichment Plant
GDP	Gaseous Diffusion Plant
HEU	Highly Enriched Uranium
LEU	Low Enriched Uranium
LLW	Low-Level Waste
NCS	Nuclear Criticality Safety
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
OSWDF	On-Site Waste Disposal Facility
PORTS	Portsmouth Gaseous Diffusion Plant
PWTARS	Portsmouth Waste Tracking and Reporting System
RCRA	Resource Conservation and Recovery Act
SMO	Sample Management Office
SOF	Sum-of-Fractions
TRU	Transuranic
TSCA	Toxic Substances Control Act of 1976
USEC	United States Enrichment Corporation
WAC	Waste Acceptance Criteria
WCP	Waste Certification Plan
WHP	Waste Handling Plan

EXECUTIVE SUMMARY

The purpose of this plan is to provide the U.S. Department of Energy (DOE) with information to make informed decisions on the waste disposition options for managing wastes resulting from decontamination and decommissioning (D&D) at the Portsmouth Gaseous Diffusion Plant (PORTS), Piketon, Ohio.

The Portsmouth Gaseous Diffusion Plant was an operating Gaseous Diffusion Plant (GDP) that was constructed in the early 1950s by the U.S. Atomic Energy Commission and operated to supply both highly enriched uranium (HEU) and low enriched uranium (LEU) for defense purposes and commercial nuclear fuel sales. In the 1970s, the Portsmouth Gaseous Diffusion Plant was selected as the site for a new uranium enrichment facility using gas centrifuge technology. In 1979, construction was started on the Gas Centrifuge Enrichment Plant (GCEP) facilities, but the project was subsequently halted in 1985 due to a reduction in the demand for enriched uranium. The Energy Policy Act of 1992 (ACT) transferred responsibility for uranium enrichment to the United States Enrichment Corporation (USEC); a newly created wholly owned government corporation. According to the ACT, USEC assumed full responsibility on July 1, 1993, for uranium enrichment operations at the Portsmouth Gaseous Diffusion Plant and the lease for the associated Portsmouth facilities from DOE. USEC became a publicly held company in 1998 which completed the privatization process. In May 2000, USEC announced that enrichment operations at the Portsmouth Gaseous Diffusion Plant would cease in 2001. DOE determined a portion of the plant and process should be maintained available for restart as a strategic plan in case of potential difficulties in the international enriched uranium market. This strategy was implemented under an agreement between DOE and USEC referred to as Cold Standby (CSB). DOE reassessed the market and decided to terminate the CSB program at the end of Fiscal Year (FY) 2005. The mission for the Portsmouth GDP buildings is now transition and deactivation.

The overall waste volume estimates for the D&D project were based on *Waste Volume/Characteristics Inventory for the Evaluation of a Potential On-Site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant (BJC 2003)* and *Preliminary Assessment for a Potential On-Site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant (BJC 2002).* These earlier studies used engineering calculations to estimate the waste volume of existing equipment and facilities. In addition, DOE has recently contracted these estimates to be developed independently (USACE 2006). Of all waste reported in these studies, only solid-phase wastes are candidates for the on-site disposal facility. Other waste including liquid waste, transuranic waste, Resource Conservation and Recovery Act (RCRA) wastes exceeding land disposal restrictions (LDR), waste generated by USEC, and DOE wastes generated offsite from other DOE projects are not considered to be acceptable waste streams for the disposal facility. Also, it is assumed that Freon, fuels and acids from aboveground and underground storage tanks, cylinders (i.e., acetylene, oxygen, ClF_3, etc.), waste from satellite accumulation, 90-day RCRA permitted storage, and low-level waste (LLW) areas, are dispositioned before D&D begins.

The waste in this plan was organized into one of the following five classifications:

- LLW,
- hazardous waste governed by RCRA,
- hazardous waste governed by the Toxic Substances Control Act (TSCA) of 1976,
- mixed hazardous waste (RCRA or TSCA and LLW), and
- sanitary waste (waste that are none of the above).

The wastes in this report were further organized into one of the following seven forms: (1) asbestos, (2) concrete, (3) demolition debris, (4) dry solids, (5) process equipment, (6) scrap metal, and (7) soil.

Based on the latest technical waste estimates (USACE 2006), the D&D remediation activities at the Portsmouth Gaseous Diffusion Plant are expected to generate approximately 1.7M cubic meters of waste. These wastes will need to be managed in a responsible and cost effective manner at disposal facilities offsite and/or in an onsite disposal facility constructed at PORTS. A summary of waste information is provided in Table ES.1 of this plan. This table is a composite of the total potential waste volume organized by waste classification.

Table ES.1. Summary of waste information

Waste type	Volume (meters^3)	Weight (Tons)
Low-Level	1,167,030	2,597,033
Low-Level Mixed	39,383	79,563
RCRA	154	629
TSCA	8,314	14,244
Sanitary	452,666	994,346
Total	**1,667,547**	**3,685,815**

1. INTRODUCTION

The Portsmouth Gaseous Diffusion Plant is located in south-central Ohio in rural Pike County, approximately 27 miles north of Portsmouth, Ohio. The Portsmouth plant was constructed during the Cold War to enrich uranium for both government and private programs. Extensive facilities were constructed to support the gaseous diffusion process. The facilities include administration and support buildings, maintenance buildings, a steam plant, laboratories, electrical switchyards, water and wastewater treatment facilities, and cleaning and decontamination facilities.

The Portsmouth Gaseous Diffusion Plant was an operating Gaseous Diffusion Plant (GDP) that was constructed in the early 1950s by the U.S. Atomic Energy Commission and operated to supply both highly enriched uranium (HEU) and low enriched uranium (LEU) for defense purposes and commercial nuclear fuel sales. In the 1970s, the Portsmouth Gaseous Diffusion Plant was selected as the site for a new uranium enrichment facility using gas centrifuge technology. In 1979, construction was started on the Gas Centrifuge Enrichment Plant (GCEP) facilities, but the project was subsequently halted in 1985 due to a reduction in the demand for enriched uranium. The Energy Policy Act of 1992 (ACT) transferred responsibility for uranium enrichment to the United States Enrichment Corporation (USEC); a newly created wholly owned government corporation. According to the ACT, USEC assumed full responsibility on July 1, 1993, for uranium enrichment operations at the Portsmouth Gaseous Diffusion Plant and the lease for the associated Portsmouth facilities from the U.S. Department of Energy (DOE). USEC became a publicly held company in 1998 which completed the privatization process. In May 2000, USEC announced that enrichment operations at the Portsmouth Gaseous Diffusion Plant would cease in 2001. DOE determined a portion of the plant and process should be maintained available for restart as a strategic plan in case of potential difficulties in the international enriched uranium market. This strategy was implemented under an agreement between DOE and USEC referred to as Cold Standby (CSB). DOE reassessed the market and decided to terminate the CSB program at the end of Fiscal Year (FY) 2005. The mission for the Portsmouth GDP buildings is now transition and deactivation.

The Portsmouth Gaseous Diffusion Plant D&D Program includes: facility dismantlement and waste disposition. Dismantlement includes surface decontamination, when and where necessary to meet the criteria for disposal, and the removal of equipment, systems, fixtures, asbestos-containing materials (ACM), facility walls, roofing, structural materials, above-grade masonry, above-grade or at-grade components, buildings, utility poles, pipe racks, and fencing. Dismantlement also includes the removal of slab-on-grade concrete, foundations, utilities, pilings, and drain lines down to 4 ft below grade. All materials or equipment resulting from dismantlement activities will require disposal. Soil incidental to dismantlement will also require disposal.

The purpose of this plan is to provide volume and associated characteristics of waste that may be generated and dispositioned to an on-site waste disposal facility (OSWDF) or to an off-site waste facility for wastes that do not meet the requirements of the OSWDF.

1.1 CURRENT WASTE MANAGEMENT PROGRAM

The current waste management program at PORTS is in compliant with DOE O 435.1, *Radioactive Waste Management* (DOE 2001a), and DOE M 435.1-1, *Radioactive Waste Management Manual* (DOE 2001b). Accordingly, DOE contractors at PORTS are required to establish appropriate programs in Quality Assurance, Safety Management, Transportation, Training and Conduct of Operations to ensure the safe, effective storage, handling, and disposition of waste.

All legacy and newly generated waste containers with the exception of general DOE Material Storage Areas (DMSAs) are currently tracked in the Portsmouth Waste Tracking and Reporting System (PWTARS) database system. The system tracks waste from cradle to grave and includes a bar coding process to identify the location of each container as it remains on-site in designated storage locations.

Waste is currently identified in PWTARS by waste category. Descriptions of the waste matrix, (e.g., solid, sludge, debris, Resource Conservation and Recovery Act (RCRA) waste codes, origins of waste, isotope and chemical contaminant/content) are also included if known. Often, waste engineers are able to gather additional characterization information based upon process knowledge and the origin of the waste. A statistical population of waste is sampled and characterized. The analytical information is tracked electronically and in hard copy.

As each container is evaluated for assignment to a disposal facility profile, the above PWTARS data are used to determine if enough information exists for characterization. Based on this evaluation, waste engineers will determine if additional sampling is necessary.

Containers are opened and inspected to determine if free liquids are present. If so, the liquids are absorbed as appropriate; confirm waste matrix information; evaluate for and remove prohibited items; and otherwise note anomalies and/or confirm PWTARS data. The information obtained is documented and the container finalized in the appropriate profile.

The current emphasis is on transportation compliance and profile assignment. Extensive characterization efforts aimed at avoiding treatment are not performed, as the additional effort is not warranted or cost-effective. Characterization is aimed at moving waste off site quickly and in a compliant manner.

The legacy waste remaining at the Portsmouth Gaseous Diffusion Plant is generally divided into four categories: low-level waste (LLW), mixed LLW, Toxic Substances Control Act (TSCA) of 1976 LLW, and special process waste. Special process wastes are those materials high in uranium-235 or technetium-99. There is a small amount of waste containing transuranic isotopes, but no TRU waste is currently identified.

LLW is sent primarily to Envirocare for disposal. Nevada Test Site (NTS) is used when compliance with the waste acceptance criteria (WAC) can be certified. RCRA LLW is either sent directly to Envirocare for disposal [meeting Land Disposal Restrictions (LDR)], or to Envirocare or PermaFix for treatment prior to Envirocare for disposal (exceeding LDRs). TSCA LLW waste may be treated at Envirocare or PermaFix with final disposition of residue at the TSCA Incinerator in Oak Ridge, Tennessee. Alternatively, it may be sent directly for incineration if the volume is on an approved burn plan. Special process waste is a subset of RCRA LLW that is problematic for off-site treatment. These wastes must be first treated and then sent to NTS for final disposal.

In summary, the Portsmouth site is currently storing, handling, and disposing of both legacy and currently generated waste in an effective and efficient manner.

2. WASTE MANAGEMENT

The anticipated D&D of the Portsmouth diffusion plant facilities will create a significant new volume of waste. The processes of hazardous materials abatement, process equipment removal, and building demolition will result in the generation of solid LLW, mixed waste, and hazardous waste, as well

as, clean building debris. The waste will be processed, packaged, transported, and disposed in accordance with the pertinent sections of the applicable or relevant and appropriate requirements (ARARs), disposal facilities' WAC, and applicable implementing plans and procedures. Processing of the radioactive wastes may include characterization, segregation, stabilization, encapsulation, and neutralization to meet the disposal facilities' WAC or as a best management practice. Training will be provided for waste management personnel to ensure conformance to regulatory requirements.

Approximately 1.7M cubic meters of solid and liquid wastes are expected to be generated as a result of this removal action. This volume estimate represents the disposal volume and includes anticipated swell factors and void ratios to account for packaging and transportation inefficiencies. This section describes the volumes and types of waste anticipated to be generated from the D&D activities and the proposed waste management strategies.

2.1 DESCRIPTION OF FORMS

The general waste types (BJC 2002, BJC 2003) expected to be generated from the D&D of the Portsmouth site are shown in Table 1 of this plan. The following paragraphs further describe these wastes according to various waste categories that will be generated during the D&D of the site.

"Residual liquid material" is primarily within equipment or reservoirs that will be drained, where possible, and containerized for proper disposal. Liquids containing polychlorinated biphenyls will be handled, as required, by TSCA. Other fluids and sludge may be considered clean or RCRA/mixed waste depending on the presence and concentrations of radioactive and/or hazardous constituents. This determination will be based on sampling/monitoring per the characterization plan covering that portion of the project work.

"Asbestos" waste includes any materials such as insulation that contains asbestos fibers. Typical asbestos waste materials include Transite, building pipe, floor tile, and cable insulation. It is likely that ACM will be prevalent in most demolition debris. The small amount of asbestos present in this report is friable material. ACM is not called out separately from demolition debris.

"Concrete" waste includes demolition materials and building materials. The main source of the waste is concrete pads, basements, and concrete building construction.

"Demolition debris" is general waste materials from razing buildings. This may include wood, rubber, concrete (that could not be separated from the rubble), siding, gypsum, roofing material, flooring, brick, etc.

"Dry solids" is the catch-all category for waste materials that do not fit a more precise category. These wastes include common trash, glass, and rubbish from facility cleanout prior to demolition, etc.

"Process equipment" waste is material and equipment that were directly used for uranium enrichment. The wastes include compressors, converters, process piping, valves, etc.

"Scrap metal" wastes are all metallic items that are other than construction debris and process equipment. These wastes include metal towers, non- process equipment, cranes, etc.

Finally "Soil" wastes include soils, sediments, and soil-like materials such as carbon filters or sludge. These wastes include excavation soils and may include some process-related wastes that are dry sludge.

The amount of soil to be excavated from below buildings during D&D activities is somewhat difficult to estimate. Non-aggressive soil removal during D&D activities was assumed to estimate soil volumes.

"Classified" waste consists of chemical compounds, metals, fabricated or processed items, machinery, electronic equipment, and other equipment, or any combination thereof containing classified information. Classified wastes require disposal at DOE-approved, secure sites.

"Secondary waste streams" will be produced in the process of cleanup of loose contamination and in the demolition itself. These waste streams may include rags, wipes, vacuum bags, personal protective equipment, and decontamination fluids. By nature of its generation, this waste stream is expected to be LLW. In an effort not to generate RCRA/LLW, chlorinated solvents will not be used, only non-RCRA solvents such as citric based cleaners are to be used.

The waste forms and the waste disposal destinations anticipated for the project (BJC 2002, BJC 2003, USACE 2006) are shown in Table 1 of this plan.

Quantities of large equipment components and piping are shown in Table 2 of this plan.

Table 2. Major equipment and piping quantities

Building components	Quantity	Unit
Converters	4120	Each
Compressors	4200	Each
Transformers	481	Each
Switchgear	500	Each
Panel boards	400	Each
Control boards or racks	400	Each
Process block valves	2800	Each

Note: The listed equipment and piping items contribute significantly to the overall waste stream volume.

2.2 GENERAL STRATEGIES FOR WASTE MANAGEMENT

The following general approaches will be used for waste management:

- Waste generated will be volume reduced to the extent that it is economically beneficial. Volume reduction will include, as appropriate, compaction and/or size reduction of architectural and structural materials, crushing of concrete debris, etc.

- Materials and wastes will be characterized per the project characterization plan(s) and managed to meet the WAC of the facility receiving them. Waste certification and planning for all wastes shall meet the applicable requirements of the ARARs prior to disposal.

- Concrete and other construction materials that meet the appropriate WAC will be disposed of on the Portsmouth site in the OSWDF.

Table 1. Waste classification, form, and destination

Waste classification	Waste form	Classified	Destination	Facility
LLW	Decon Solution	N	Direct Access Facility Onsite	Onsite/Various
LLW	Other Aqueous Solutions	N	Direct Access Facility Onsite	Onsite/Various
LLW	Oils	N	Approved off-site facility	Various
LLW/TSCA	Oils	N	Approved off-site facility	TSCA/Various
LLW	Asbestos/Transite	N	PORTS	OSWDF
Sanitary	Asbestos/Transite	N	PORTS	OSWDF
LLW	Concrete	N	PORTS	OSWDF
LLW/ RCRA	Concrete	N	PORTS or approved off-site facility	OSWDF Various
LLW/TSCA	Concrete	N	PORTS	OSWDF
Sanitary	Concrete	N	PORTS	OSWDF
LLW	Demolition Debris	N	PORTS	OSWDF
LLW/RCRA	Demolition Debris	N	PORTS or approved off-site facility	OSWDF Various
LLW/TSCA	Demolition Debris	N	PORTS	OSWDF
Sanitary	Demolition Debris	N	PORTS	OSWDF
LLW	Dry solids	N	PORTS	OSWDF
LLW/RCRA	Dry solids	N	PORTS or approved off-site facility	OSWDF various
LLW/TSCA	Dry solids	N	PORTS	OSWDF

Table 1. Waste classification, form, and destination (continued)

Waste classification	Waste form	Classified	Destination	Facility
RCRA	Dry solids	N	PORTS or approved off-site facility	OSWDF various
Sanitary	Dry solids	N	PORTS	OSWDF
LLW	Process equipment	Y/N	PORTS	OSWDF
LLW	Scrap metal	N	PORTS	OSWDF
LLW/RCRA	Scrap metal	N	OSWDF	OSWDF
LLW/TSCA	Scrap metal	N	PORTS	various
RCRA	Scrap metal	N	PORTS or approved off-site facility	OSWDF various
Sanitary	Scrap metal	N	PORTS	OSWDF
LLW	Soil	N	PORTS	OSWDF
LLW/RCRA	Soil	N	PORTS or approved off-site facility	OSWDF various
LLW/TSCA	Soil	N	PORTS	OSWDF
Sanitary	Soil	N	PORTS	OSWDF

- Initial waste assumptions for the project are as follows:
- Waste is to be characterized prior to generation.
- Contaminated waste meeting the OSWDF WAC will be disposed at the OSWDF.
- Contaminated waste exceeding the OSWDF WAC will be disposed at an appropriate off-site facility.
- Waste requiring treatment will be treated prior to disposal. For example, this may include oils or similar materials that are handled by a pre-approved commercial facility or physical treatment (crushing/cutting/filling void spaces, etc) for the OSWDF or macro-encapsulation within the OSWDF.
- Classified waste can only be sent to the OSWDF or an approved DOE facility.

2.2.1 Waste Minimization and Reduction Efforts

Based on the boundaries established by project specifications and DOE guidance in effect at the time, the project team will determine whether a waste stream can be economically decontaminated for reuse or disposal at a lower classification of waste as part of the waste minimization discussions in, or referenced in, the Waste Handling Plans (WHP). The WHPs will review volume reduction, segregation, or other methods that would be planned to conserve OSWDF disposal capacity as it pertains to the project.

Project workers will be encouraged and work packages developed, as much as possible, to minimize generation of wastes and to maximize reuse of materials in accordance with DOE guidance in effect during the D&D activities.

Construction debris materials, such as concrete, masonry, and block, with incidental amounts of wood, wallboard, etc., and containing low levels of residual contamination, may be crushed and used as earthen fill material. Note that any materials or debris generated by the project and planned to be disposed of onsite at the Portsmouth OSWDF will meet the requirements of the OSWDF WAC.

2.3 WASTE CHARACTERIZATION, SEGREGATION, AND DISPOSAL

The general activities required for waste handling, segregation, and disposal are shown in Fig. 1 of this plan. The general process steps are as follows:

- DOE and the D&D contractor will have a scoping meeting to agree on the content of the WHP/Waste Certification Plan (WCP), to review existing data, and to identify data gaps (data quality objective process);
- The D&D contractor will prepare a draft WHP/WCP, which will be reviewed by DOE;
- The D&D contractor then revises the draft and prepares the WHP/WCP; and
- The document is transmitted to DOE who transmits it as required.

Existing data will be used, whenever possible, to define the waste types/lots; identify the proposed disposal facilities; and identify additional data needed to meet the disposal facility WAC.

Characterization and sampling plans will be prepared prior to the Portsmouth Gaseous Diffusion Plant remediation or demolition activities, in accordance with the Code of Federal Regulations (CFR) requirements in Title 10, Energy; Title 29, Labor; Title 40, Protection of the Environment; and Title 49, Transportation. Due to the size and duration of the D&D effort, it is anticipated that more than one characterization and sampling plan will be needed. However, facilities or sites with similar chemical and radiological hazards may be grouped into a single plan as appropriate.

Objectives, procedures, records management, quality assurance, and quality control requirements for facility or site characterization will be established in the characterization and sampling plans. These plans will be developed according to data quality objectives (DQOs), to ensure that the data supporting Office of Environmental Management decisions, hazard analyses, risk assessments, WAC, transportation, and remedial action effectiveness verifications are appropriately identified, collected, and maintained. The project manager will ensure that the DQO process is applied in a graded approach as defined in *Environmental Protection Agency guidelines* (EPA 2006).

Historical data and information, process knowledge, radiological surveys, and observations reported during prior facility evaluations and due diligence walk-downs for the Portsmouth Gaseous Diffusion Plant sites and facilities will be used to optimize sampling plans. Projects will evaluate existing and historical data in the preparation of sampling plans and prior to field sampling activities. Sources of historical information include preliminary hazard analyses, documented hazard analyses, environmental audits supporting the transition of GDPs to USEC, and due diligence reports for the turnover of USEC facilities to DOE contractors. Historical data from RCRA monitoring and treatment actions, industrial hygiene monitoring, and analysis in support of waste disposal to the local landfill are available in the Portsmouth Waste Information System and the Portsmouth Records Management Document Center.

Samples will be collected from materials, items, or areas that: (1) potentially contain hazardous or radiological contaminants, or (2) are indicators of contamination in an area. When process knowledge indicates that hazardous or radiological materials may be present, it is necessary to sample adequately, to determine within a reasonable certainty that the materials are not present at levels exceeding the appropriate free release criteria.

Radiological surveys will be performed to identify the location and extent of areas that will require either: (1) remediation prior to unrestricted release for demolition and disposal as non-radiological waste, or (2) removal, packaging, and disposal as radiological waste during demolition. The performance and evaluation of these surveys will be done in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual, which bases the rigor of the survey on the potential for contamination and the consequences of failing to identify residual contamination.

Soil, building material, chemical, air, gas, and waste sampling will be performed in accordance with the U.S Environmental Protection Agency (EPA) procedures and requirements for sampling techniques, the number of samples, containers, preservatives, holding times, chemical analyses, field and laboratory quality control, chain of custody, and records management.

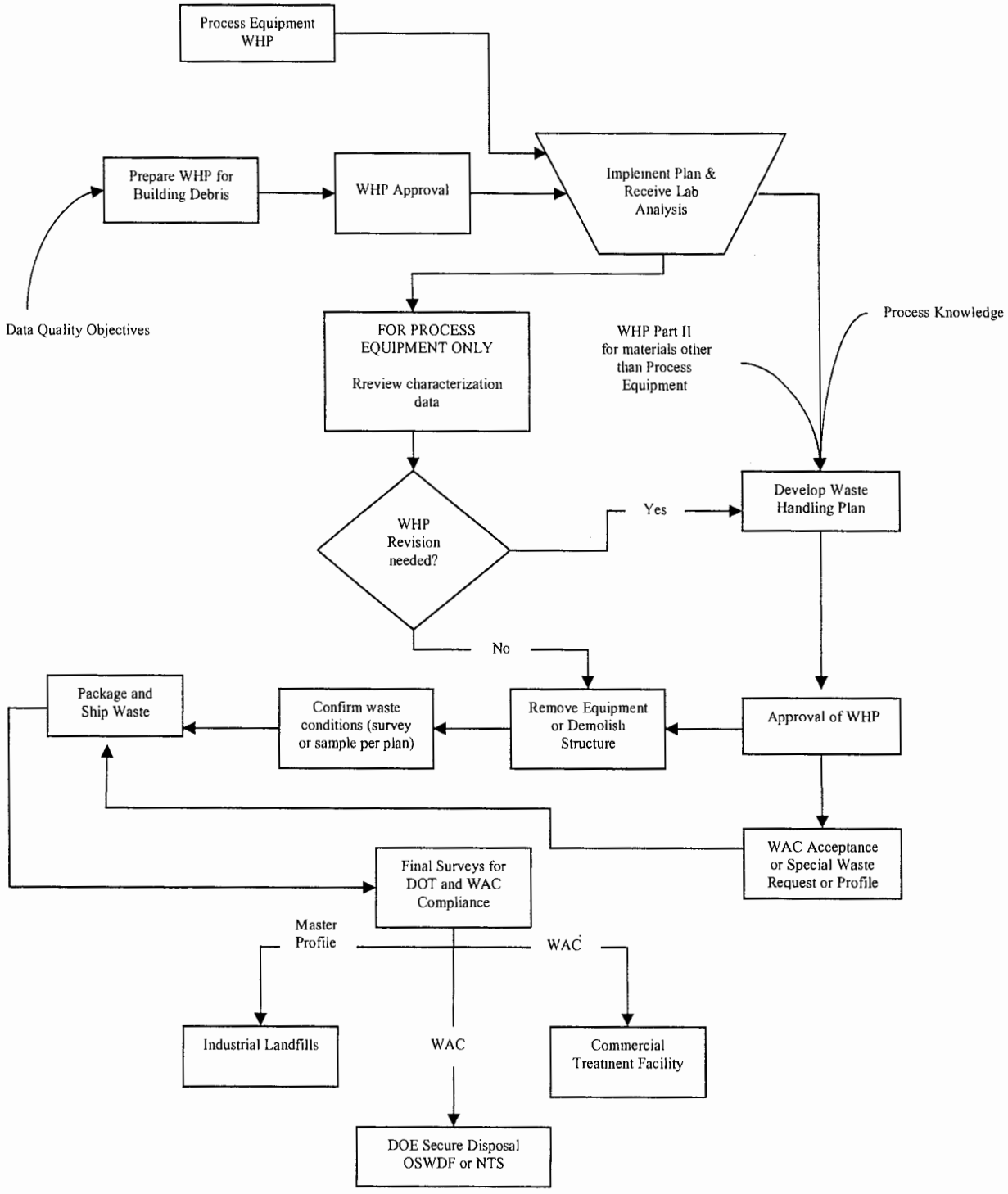

Fig. 1. Waste handling, segregation, and disposal activities.

Laboratories selected to analyze samples will be certified to analyze materials according to EPA regulations and DQOs, e.g., waste destined for Envirocare must be analyzed by a laboratory certified by Envirocare to perform the WAC analyses. Laboratories in the DOE Sample Management Office (SMO) program are audited for regulatory compliance. However, other laboratories with demonstrated certified compliance with the appropriate EPA and WAC requirements may also be used. This includes local or Portsmouth Gaseous Diffusion Plant site laboratories.

All field activities will be performed under an approved site health and safety program. Activity hazard analyses will be prepared for the tasks to be performed in the characterization of sites and facilities. Areas posted as radiological will be characterized under an approved Radiation Work Permit. Waste generated during the characterizations process will be containerized and handled according to site waste management requirements.

A report describing the survey activities and findings will be prepared to support remediation or demolition of the sites and facilities. The report will provide a description of the completed activities, the locations of collected samples, and the results of all laboratory analysis.

Waste will be segregated using a combination of process knowledge, radiological surveys, and characterization data. The waste segregation process will be described and approved by DOE in the WHP.

Certain equipment and components, or piping, with either significant deposits of enriched uranium or high levels of ^{99}Tc may be segregated for decontamination or special handling. In order to ensure nuclear criticality safety (NCS), an areal uranium density less than 700 g of $^{235}U/m^2$, and a per item maximum content less than the always-safe mass (ASM) at the assay of concern, and a bulk concentration less than 0.002 g $^{235}U/g$ waste for enrichments greater than 0.96% will be maintained at the OSWDF. Most of the process equipment in X-330 and the X-333 is expected to satisfy these criteria when placed side by side in the OSWDF directly without special decontamination. Some pieces of equipment may require dismantling and deposit removal to reduce the ^{235}U amount to a level that would satisfy the OSWDF (NCS) criteria. The process equipment will not be filled with soil, grout, or other uncontaminated equipment debris, or concrete under this project. Small fissile containing equipment items may be placed in the OSWDF in burial containers. The void volume of these containers will not be filled as long as the NCS criteria are satisfied. Security sensitive items will be covered as appropriate during transit and until covered with soil. Utilizing the process building cranes and hatch cover access, process equipment and other large items will be loaded onto size appropriate trucks and trailers, staged in the truck/track alley, and transported to the OSWDF. At the OSWDF it will be off-loaded using mobile cranes or all-terrain fork lifts rated for the loads being lifted and placed into the cell in an NCS compliant manner.

Equipment that cannot meet the 700 g $^{235}U/m^2$, and always-safe uranium mass at the assay of concern, and less than 0.002 g $^{235}U/g$ waste criteria may be dismantled to the extent required to gain access to and facilitate the removal of the uranium deposit. The deposits will be removed through primarily mechanical techniques while still in the process building or a specially prepared segmentation facility and using increasingly more aggressive removal techniques such as vacuuming, scraping, wire brushing, CO_2 blasting, etc. to remove the deposits when accessible. Liquid solvents may be used on a limited and restricted basis if dry decontamination is unsuccessful. This would generate secondary liquid wastes that would need to be disposed of off site. All decontamination processes will be conducted in a manner so not to create uncontrolled contaminated dusts and other airborne contamination.

Waste will then be packaged and shipped to the appropriate disposal facility. The project will utilize individuals qualified in waste management and transportation requirements for the waste disposition process. The anticipated waste types and disposition methods are shown in Table 1 and Table 2 of this plan.

2.4 WASTE APPROVAL PROCESS FOR OSWDF

The OSWDF WAC will be documented in the Waste Management Plan which will be approved by DOE. This plan specifies the waste characterization requirements, WAC, and the request and approval process for waste proposed for disposal at the OSWDF. Wastes generated from the proposed D&D and planned for disposal at the OSWDF will be characterized and evaluated for disposal in accordance with the procedures specified in the WAC.

In general, the preliminary WAC process is depicted in Fig. 2. Initially, a waste stream comprising waste materials that will be generated by a project is divided into waste lots at the convenience of the D&D project in conjunction with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. Each waste lot is considered for approval and for disposal on its own merits based on information provided by the D&D project. Such considerations can include effects of various treatment technologies proposed for a waste lot. The first step in the process, labeled (D1) in the flowchart, ensures that the correct information is presented for approval of the specific waste lot. The second step (D2) ensures that sufficient characterization information is available for the waste lot to correctly describe its contaminants and concentrations. The third step (D3) evaluates the impact of individual waste lots on the volume-weighted sum-of-fractions (SOF) for the entire OSWDF. Once approved, the waste will be shipped for disposal.

A PORTS Project team will work closely with the OSWDF project team to ensure that the wastes from the proposed D&D project planned for disposal at the OSWDF are in an acceptable form to meet the criteria in the WAC Plan.

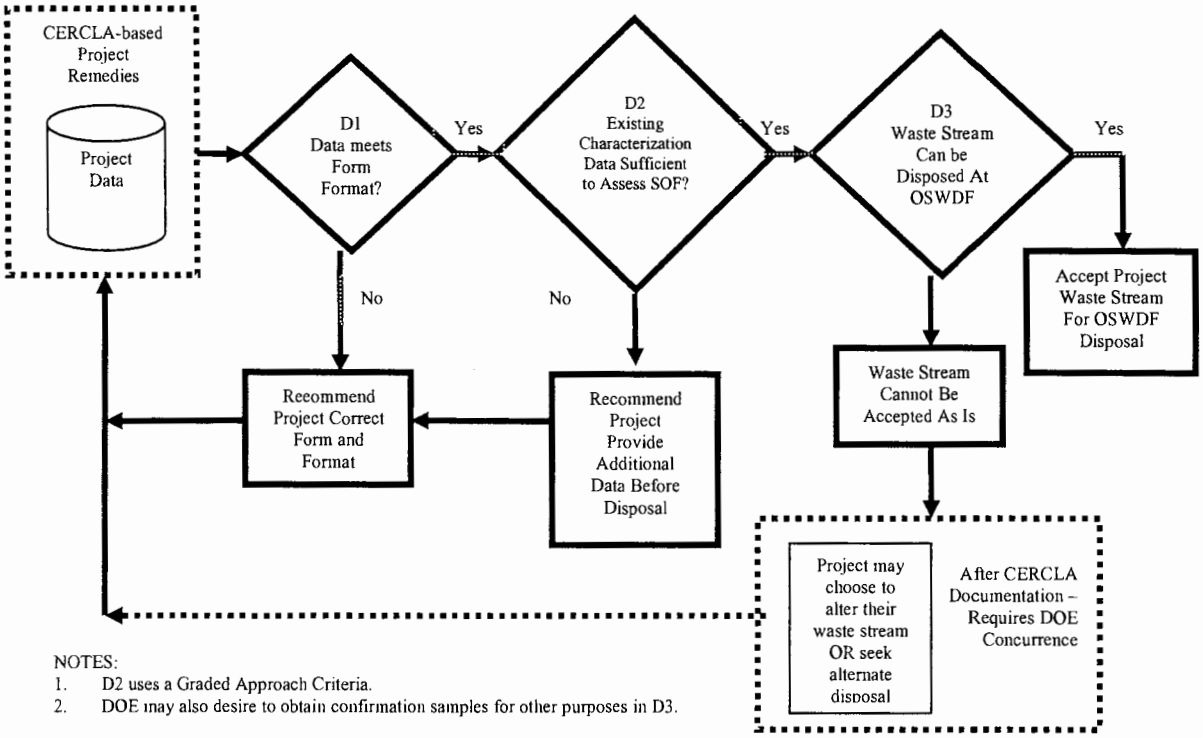

Fig. 2. Decision logic for OSWDF

2.5 WASTE PACKAGING AND TRANSPORTATION

The project will transport wastes (after radiological and chemical characterization) to the OSWDF and other off-site waste disposal facilities as necessary. A Motor Carrier Evaluation Program approved transporter will transport waste off site. A significant quantity of the waste and materials removed from the Portsmouth Gaseous Diffusion Plant process buildings (process equipment) is considered radiologically contaminated, classified material. Radiologically contaminated, classified waste and materials from the Portsmouth site will be, as required: (1) packaged and locked with a security tampering indicator device and transported to a location inside the Portsmouth site security fence for staging and eventual disposal at the OSWDF; or (2) packaged, locked, and transported directly to an approved off-site disposal facility for disposal. The transportation subcontractor will be required to adhere to the requirements established in DOE Order 470.4 (DOE 2005) and DOE Manual 473.1-1 (DOE 2002) that apply to shipping and transporting of classified materials, as well as, the D&D contractor special conditions for shipping and transporting notifications.

The D&D project is expected to carry out only limited size reduction prior to transporting waste to the disposal site. Size reduction is the process where process and auxiliary equipment items, and other building debris are cut, crushed, shredded, or otherwise compacted in order to conserve space in the OSWDF by more or less elimination of void volumes. Attempting size reduction requires an economic decision based primarily on the value of the difference in space in the OSWDF that the item will require with and without size reduction. It may be necessary to reduce certain equipment items size to allow safe and otherwise reasonable transportation to the OSWDF.

In the event that an item or items must be shipped off-site for disposal, the economics must also include the incremental costs of shipping with and without size reduction. Also some items are impractical to ship without some reduction in size. Methodology of size reduction and where this can be accomplished will also affect the economics of this potential step in the D&D process.

Size reduction techniques vary from simple compaction with heavy equipment at the landfill to methodical cutting/burning features into shapes that combine to form more compact configurations. Light gauge sheet metal objects such as fans and ductwork will most readily be size reduced at the landfill by crushing with landfill equipment (bull dozers, sheep's foot rollers, etc.). High density items (items with little void volume such as electric motors, transformers, compressors, etc.) that would generally require significant manual cutting/burning/dismantlement to achieve perceptible size reduction would not be expected to undergo size reduction. Medium density items and heavy gauge hollow items such as process and other large diameter piping (>18-in.-diam), surge drums, lube oil and refrigerant storage tanks, etc., are expected to be collapsible or shear-able using hydraulic field demolition equipment. These items would all be expected to incur limited size reduction. Ultimate size reduction of cylindrical objects would be realized by cutting or slitting in two locations approximately 170° apart parallel to the axis of the cylinder. Volumetric reductions as high as 90 % could be achieved. As long as the cost of the slitting operation was less than the value of the equivalent landfill space, this would be cost effective. A super compactor similar to that constructed for the East Tennessee Technology Park K-31 and K-33 buildings is not expected to be required.

2.5.1 Transportation of Fissile Materials

Requirements for packaging and shipping radioactive materials also apply to shipments of fissile materials. The potential for these materials (if in the proper quantity and geometric configuration) to undergo spontaneous nuclear chain reaction (criticality) limits packaging and shipping options. Under conditions where the amounts or concentrations of fissile material are low, as described in Section 2.5.2 of this plan, there are no additional packaging requirements beyond those for other

radioactive materials. As the quantity or concentration of fissile material increases per package, strict limits are imposed to ensure against nuclear criticality. Controls are placed on the number and amount of fissile material packages aboard a transport conveyance. The number of packages of fissile Class 7 (radioactive) material is described in 49 CFR 173.457. In any non-exclusive-use transport vehicle must be limited so that the sum of the criticality safety indices (CSIs) does not exceed 50. Except for consignments under exclusive use, the CSI of any package, or over-pack, may not exceed 50. A fissile material package with a CSI greater than 50 must be transported by exclusive use. For shipments of fissile material packages being transported under exclusive-use conditions, the sum of CSIs may not exceed 100.

2.5.2 U.S Department of Transportation (DOT) Fissile Material Exceptions

Although the applicable packaging limitations and requirements for radioactive materials may apply, packages containing any fissile material, as defined previously here, may be excepted from the additional fissile material packaging and transportation requirements (49 CFR 173.453). The exceptions within these regulations that may be applicable to the project waste streams and approved by the shipper are described in 49 CFR 173.453. These exceptions are based on limitation of fissile material mass or concentration, as well as limitations on total mass and quantities of moderators, such as beryllium, graphite, and hydrogenous materials (e.g., water, plastics, etc.) enriched in deuterium.

Fissile material requirements are not required for natural or depleted uranium. Also, in any case where a shipper uses an exception to the regulations, the shipper must be able to demonstrate by either analytical data or process knowledge that the limit is not exceeded.

2.5.2.1 Specific DOT fissile material packaging limitations

The amount of fissile material that can be placed into a single package is limited based on the concentration [weight percent (wt %)] of fissile material and the total amount of fissile material.

Specific DOT packaging requirements are contained in 49 CFR 173.417 or on the packaging certificate. Except as provided in 49 CFR 173.453, fissile materials containing not more than Al or A2 (49 CFR 173.435), as appropriate, must be packaged in one of the following packages:

- any packaging listed in 49 CFR 173.415, limited to the Class 7 (radioactive) materials specified in 10 CFR Part 71, Subpart C; or;
- any Type AF, Type B(U)F, or Type B(M)F packaging that meets the applicable standards for fissile material packages in 10 CFR Part 71.

Fissile Class 7 (radioactive) materials with radioactive content exceeding A1 or A2 must be packaged in one of the following: Type B(U) or Type B(M) packaging that meets the standards for packaging fissile materials in 10 CFR Part 71, and is approved by the Nuclear Regulatory Commission (NRC) and used in accordance with 49 CFR 173.471.

Notwithstanding, continued use of the existing fissile material packages constructed to DOT Specifications 6L, 6M, or 1A2, is authorized until October 1, 2008. Continued use is based on each package conforming in all respects to the requirements of 49 CFR 173.417 that were in effect on October 1, 2003.

2.5.2.2 Other packaging options

For packaging radioactive materials for which the above packaging options will not suffice,

the shipper may design and construct a package wherein the package can accommodate larger contents. These packages must be designed to meet the performance criteria of the NRC or the International Atomic Energy Agency, in accordance with 49 CFR 173.471 and 10 CFR Part 71 requirements.

2.5.2.3 Exemptions from DOT, DOE, NRC, or fissile packaging requirements

During the D&D project, most large equipment items will be effectively size reduced as necessary to allow packaging and transportation via commercially available packaging options. For items or objects that cannot be packaged in existing certified or allowed packaging because of their fissile contents or physical size, and package certification is an unreasonable option; DOT may allow for an exemption from specific regulatory requirements (49 CFR 107.101). When applying for an exemption or to show NRC equivalency, the project must detail which requirement(s) will not be met, along with a detailed description of the proposed equivalency and a statement outlining the basis for the equivalency. The justification for packaging or transportation must demonstrate that a level of safety equivalent to that required by the NRC and DOE regulations will be achieved. To demonstrate safety consistent with the public interest, the application should incorporate relevant shipping and incident experience, along with a description of any compensatory measures to be taken to address the associated risks. In any event, the project intends to demonstrate equivalency to ship material over the road that cannot meet existing regulations.

3. REFERENCES

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